NORTHERN

Utilization Research & Development Division

Publications and Patents

January - June 1964

Agricultural Research Service
United States Department of Agriculture

CONTENTS

	Page
Introduction	3
Requests for Information	3
Subject Index for Publications	4
Publications	5
Patents	30
Licensing of Patents	31

Northern Utilization Research and Development Division
Agricultural Research Service
United States Department of Agriculture
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INTRODUCTION

The Congress in 1938 authorized four regional laboratories, now known as Utilization Research and Development Divisions, to conduct basic and applied research designed to expand, improve, and develop through science and technology the utilization of American farm crops. The need and importance of such research arise because the farmer is not organized to carry on modern scientific research to maintain old markets for his products and to create new ones. Since their inauguration, these laboratories have contributed much basic knowledge of the chemical composition and physical properties of farm commodities and have applied this knowledge to create new or improved products and processing technology that have enhanced utilization of many farm commodities.

The Northern Division is responsible for research on industrial utilization of the cereal grains—corn, wheat, barley, grain sorghum, and oats; and the oilseeds—soybeans and flaxseed. Except for wheat and barley, the research includes food and feed uses of these crops. In the Department's program of research on replacement crops, the Northern Division conducts all screening and characterization studies on uncultivated plants and their components. It is also responsible for more intensive research on new oilseeds containing erucic acid and on new gum and pulp fiber plants. In addition to its internal program of research, it carries out work through domestic contracts and grants and conducts related research abroad under grants or contracts involving Public Law 480 funds.

The research investigations at the Northern Division are supported by more than 400 people, about one-half of whom have professional status. This body of highly trained men and women with specialized knowledge in various disciplines are responsible for the scientific publications and patents listed here.

F. R. Senti, Director

REQUEST FOR INFORMATION

The results of the research of the Northern Division are published regularly in the technical literature, and public-service patents are secured to cover patentable inventions and discoveries (see page 30). As a convenient guide to our publications and patents, a list with abstracts is published semiannually. The abstracts describe the current research and indicate the progress achieved. Further information on any of the developments, as well as earlier technical papers, may be obtained by writing us.

In conformance with the policy of the Department of Agriculture, Northern Division publications are available to scientists and other specialists, librarians, representatives of the press, and others interested.

Requests for specific reprints should be by number and addressed to the Northern Division. Those titles marked with an asterisk [*] are not available for distribution.

Most of the publications are in journals that are available in libraries. Photographic copies of most journal articles on research at this Division can be purchased from the National Agricultural Library of the U.S. Department of Agriculture, Washington, D.C. 20250.

No publications will be sent regularly in response to foreign requests unless exchange arrangements have been made with the Director of the National Agricultural Library.

Copies of previous lists of publications and patents are available upon request.

January — June 1964

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SUBJECT INDEX FOR PUBLICATIONS

[Compiled by reprint order number. Numbers marked (*) do not have reprints available for distribution.]

CEREAL GRAINS:

General: 1618, 1620, 1622, 1643, 1666, 1669, 1670, 42-F, 43-F, 44-F, 46-F, 48-F, 50-F, 53-F*

Starch: 1618, 1622, 1640, 1646, 1647, 1648, 1651*, 1652*, 1653*, 1654*, 1655*, 1656*, 1657*, 1687, 119-C, 59-F

Wheat: 1614A, 1618, 1648, 1649, 1651*, 1663, 1664, 1671, 1676*, 1678, 116-C, 121-C

Corn, Sorghum, and Other Grains: 1619, 1630, 1645, 1653*

High-Amylose Corn: 1648, 1687

Fermentative Conversion and Microbiology: 1474, 1623, 1624, 1650, 1665, 1667, 1668, 1672, 1680, 1682, 1683, 1688, 1694, 1697, 117-C, 118-C, 45-F, 51-F

OILSEEDS:

General: 1621, 1625, 1630, 1631, 1632, 1633, 1634, 1635, 1636, 1641, 1661, 1691, 1692, 115-C, 56-F, 60-F, 61-F

Linseed Oil: 1628, 1629, 1681, 120-C, 57-F, 60-F, 61-F

Soybean Oil: 1625, 1626, 1627, 1632, 1642, 1659, 1675, 1693, 1695, 1696, 122-C, 47-F*, 52-F, 54-F, 55-F, 58-F

Soybean Meal and Protein: 1633, 1635, 1639, 1644, 49-F, 58-F

Fermentative Conversion and Microbiology: 1621, 1677, 1686

NEW CROPS:

General: 1630, 1637

Oilseeds: 1631, 1637, 1638, 1658, 1660, 1662, 1673, 1674, 1679, 1684, 1689, 1690

Vegetable Gums: 1637

Pulping Crops: 1685

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PUBLICATIONS

[Publications marked (*) are not available for distribution. When requesting reprints, please order by number.]

1614A • Air Classification Response of Flours from Hard Red Winter Wheats after Various Premilling Treatments. Part 2

A. C. STRINGFELLOW, V. F. PFEIFER, and E. L. GRIFFIN, JR.

Northwest. Miller 270(1):12, 13, 16-18. January 6, 1964

The concluding part of this paper presents the results and discussions of the work, along with tables on premilling treatment and a set of diagrams showing mixing curves of the flours obtained from both Concho and Wichita hard red winter wheats. A bibliography concludes Part 2.

1617 • Publications and Patents of the Northern Utilization Research and Development Division, July-December 1963

NORTH. UTIL. RES. DEVELOP. DIV.

U. S. Agr. Res. Serv., unnumb. pub., 28 pp. January 1964. [Processed]

A semiannual list containing abstracts describing results of current research work that appeared as a publication or patent during the specified period.

1618 • A Rapid Cooking Viscometer for Process Control

E. B. LANCASTER

Cereal Sci. Today 9(1):10, 11, 26. January 1964

A rapid cooking viscometer constructed from inexpensive components has been used to predict the viscosity of pastes of an acid-modified flour product and the extent of modification during the process. A 10-gram sample of reacting material can be cooked rapidly, and the peak viscosity measured in less than 1 minute. Details of construction and operation, correlation with other viscometers, and relation between speed, torque, and instrument readings are given.

1619 • [Carotenoids of Corn and Sorghum. IV.] Parental Influence on Xanthophylls and Carotenes in Corn

C. O. GROGAN,[1] C. W. BLESSIN, R. J. DIMLER, and C. M. CAMPBELL[1]

([1]Mississippi State University and USDA Crops Research Div., State College, Miss.)

Crop Sci. 3(2):213-214. March-April 1963

Analyses of 17 reciprocal single crosses showed that pollen source influences considerably the content of xanthophylls and carotenes in first generation seed. Actual values and values calculated on the basis of the mean of a weight of two-thirds for the female gametes and one-third for the male gametes were in fairly close agreement. Among the yellow lines for the two classes of carotenoids under study dominance was lacking. Additive gene action was indicated. Crosses involving a white line and four different high-xanthopyll lines suggested that one yellow gene in the endosperm of the F_1 seed was responsible for producing an average of 6.5 p.p.m. xanthophylls. Geometric gene action in the YYy and YYY was indicated by an increase in xanthophylls of 2.5 to 2.8 times for each additional gene dosage in the sequence.

1620 • Theoretical Equations for Ultracentrifugal Molecular Weight Determinations of Polyelectrolytes

STIG R. ERLANDER

Iowa State J. Sci. 38(3):323-375. February 1964

Both equilibrium and approach-to-equilibrium methods for determining the molecular weights of polyelectrolytes are widely used. However there exists confusion as to interpretation of data secured. Certain topics, such as the extrapolated weight with and without added salt and the exact effect of electrostatic charge, are subject to individual interpretation. Often other factors are ignored. These and other subjects are brought to the attention of scientists who make use of existing theoretical equations.

Part I, the first of the five sections of this review, deals with basic equations and their application to a homogeneous electrolyte.

Part II develops the consequences of the finding that completely dissociated proteins cannot exist in aqueous solutions in the presence of large amounts of salt. It is noted that the extrapolated molecular weight in the absence of added salt is both theoretical and practical.

Part III discusses equations relating to the heterogeneity of polyelectrolytes.

In Part IV (the dipole moment) are developed equations that include the electrical potential term apparently ignored in the earlier literature.

Part V (the binding coefficient) discusses the possible effect that the ionic atmosphere of a polyelectrolyte may have on the concentration coefficient and on extrapolated molecular weight.

1621 • A Mould Inhibitor in Soybeans

C. W. HESSELTINE, R. DE CAMARGO, and J. J. RACKIS

Nature 200(4912):1226-1227. December 21, 1963

A water-soluble, heat-stable factor(s) was demonstrated to exist in varieties of soybeans and to be fungistatic to *Rhizopus oligosporus*. This fungus, essential to the fermentative manufacture of the Indonesian food tempeh, may be used as an assay organism for the isolation of this factor(s).

1622 • Starch from Cereal Grains. A Short Method for Laboratory Extraction

[ROY A. ANDERSON] NORTH. UTIL. RES. DEVELOP. DIV.

U. S. Agr. Res. Serv., CA-71-25, 2 pp. February 1964. [Processed]

A description of a simplified laboratory method for recovering starch from small samples of cereal grains. Only a minimum amount of equipment, all usually available in chemical laboratories, is required. The method is one patterned after an earlier bench-scale procedure for wet milling grains.

1623 • Physiology of Bacterial Chromatophores

J. W. NEWTON

"Bacterial Photosynthesis," eds. H. Gest, A. San Pietro, and L. P. Vernon, a symposium sponsored by The Charles F. Kettering Research Laboratory at Antioch College, Yellow Springs, Ohio, March 18-20, 1963, pp. 307-314. Ohio. 1963

Current research is reviewed on the structure and function of chromatophores from photosynthetic bacteria. A speculative scheme is presented of energy transfer from the pigment system to electron transport components in the chromatophore. Also presented and discussed is some recent work on possible mechanoenzymatic systems in chromatophores.

1624 • Composition of Bacterial Chromatophores

J. W. NEWTON

"Bacterial Photosynthesis," eds. H. Gest, A. San Pietro, and L. P. Vernon, a symposium sponsored by The Charles F. Kettering Research Laboratory at Antioch College, Yellow Springs, Ohio, March 18-20, 1963, pp. 469-474. Ohio. 1963

Available information on the gross composition, electron transport constituents, and pigment composition of chromatophores from photosynthetic bacteria is reviewed.

1625 • Analog Computers and Kinetics of Hydrogenation

R. O. BUTTERFIELD, E. D. BITNER, C. R. SCHOLFIELD, and H. J. DUTTON

J. Am. Oil Chemists' Soc. 41(1):29-32. January 1964

Investigations of the kinetics of consecutive reactions frequently require complicated calculations to determine specific reaction rate constants from experimental data. Analog computers permit a convenient empirical adjustment of rate constants in kinetic equations to match experimental results. Once an electronic network analogous to the chemical reaction system is set up, specific reaction rates can be determined by adjusting potentiometers, which are the analogs of the rate constants, until an acceptable fit of calculated and experimental data is reached. Applicability of a small analog computer to the kinetics of hydrogenation is presented.

1626 • Deuterium-Hydrogen Exchange During the Catalytic Deuteration of Methyl Oleate

W. K. ROHWEDDER, E. D. BITNER, HELEN M. PETERS, and H. J. DUTTON

J. Am. Oil Chemists' Soc. 41(1):33-36. January 1964

Extensive exchange of deuterium for carbon-bonded hydrogen takes place during the catalytic reduction of methyl oleate with gaseous deuterium. Mass spectrometric analysis of the deuterated stearate shows that it is composed as follows: a small part of one molecular species contains no deuterium; the largest contains 1 atom of deuterium; nearly as much contains 2 atoms; and progressively smaller numbers of molecules contain 3, 4, 5, and up to 11 atoms of deuterium per molecule.

No appreciable exchange occurred with the hydrogen of methyl stearate in the presence of active palladium catalyst and deuterium.

Methyl oleate, containing up to 9 atoms of deuterium in one species and 1½ moles of deuterium average per mole, has been separated from the partially deuterated ester. This octadecenoate has 60 to 65% of its double bonds in *trans* configuration and only 18% of its double bonds in the original 9,10-position.

1627 • Isotopic Effects During Catalytic Hydrogenation

E. D. BITNER, E. SELKE, W. K. ROHWEDDER, and H. J. DUTTON

J. Am. Oil Chemists' Soc. 41(1):1-3. January 1964

No isotopic discrimination is observed during catalytic reduction of methyl oleate with hydrogen-tritium gas mixtures. One explanation may be that at atmospheric pressure and 40°C. the istopic effect on solubility is small and the concentration of the dissolved hydrogen isotopes is rate limiting. Tritium in methyl 9-octadecenoate-9,10-T is not released during saturation of the double bond but appears in the gaseous phase upon completion of hydrogenation, as indicated by an ion chamber. No isotopic discrimination is observed in the reduction of methyl oleate wtih mixtures of hydrogen, deuterium, and tritium; however, a mass spectrometer indicates an increase in the hydrogen-deuterium ratio during hydrogenation. Under the conditions described, tritium and deuterium may be used to study the mechanism of hydrogenation without significant isotopic effects.

1628 • Cyclic Fatty Acids from Linolenic Acid

R. A. EISENHAUER, R. E. BEAL, and E. L. GRIFFIN

J. Am. Oil Chemists' Soc. 41(1):60-63. January 1964

Linolenic acid of 95% purity was heated with excess alkali in ethylene glycol to produce cyclic fatty acids. Reaction variables, which are associated with the cyclization reaction and which were investigated, included solvent-to-fatty-acid ratio, catalyst concentration, reaction temperature, headspace gas N_2 or C_2H_4, and headspace gas pressure.

Yields of cyclic acids were improved by increasing solvent ratio (1.5-6 weight basis), reaction temperature (225°-295°C.), and catalyst concentration (10-100% excess). With nitrogen the optimum catalyst concentration was about 100% excess, but when ethylene was used, no increase was obtained beyond 50% excess catalyst. Yields of polymeric acids produced in the reaction generally decreased as cyclic acid yields increased, except in one instance.

Higher yields of cyclic fatty acids were obtained with ethylene than with nitrogen under all comparable conditions, and increasing the ethylene pressure to as high as 500 p.s.i. improved the yield. Ethylene adds to the conjugated double bonds and is believed to give C_{20} fatty acids having a 1,4-disubstituted monoene ring in the chain. The maximum yield of monomeric cyclic acids from 95% linolenic acid was 84.6%, the balance being polymeric and unreacted monomeric acids. Monomeric acids from this test contained 95% cyclic acids.

1629 • Linseed Oil. Compositions for Curing Concrete

[W. L. KUBIE] NORTH. UTIL. RES. DEVELOP. DIV.

U. S. Agr. Res. Serv., CA-71-26, 4 pp. February 1964. [Processed]

Preparation and properties are given for a linseed oil formulation that can be mixed with water at the site of application to concrete. This curing emulsion should be applied as soon as the concrete is finished (broomed, dragged, or troweled). In warm weather it may be desirable to incorporate white pigment in the curing compound to prevent excessive temperatures from developing in the surface of the concrete and causing failure. Pertinent references are given.

1630 • Composition of Oilseeds. A List of Publications for 1963

NORTH. UTIL. RES. DEVELOP. DIV.

U. S. Agr. Res. Serv., ARS-71-23-2, 3 pp. February 1964. [Processed]

1631 • **Processing Oilseeds, Oil, and Meal. A List of Publications and Patents for 1963**
NORTH. UTIL. RES. DEVELOP. DIV.
U. S. Agr. Res. Serv., ARS-71-24-2, 1 p. February 1964. [Processed]

1632 • **Edible Soybean Oil. A List of Publications for 1963**
NORTH. UTIL. RES. DEVELOP. DIV.
U. S. Agr. Res. Serv., ARS-71-25-2, 2 pp. February 1964. [Processed]

1633 • **Edible Soybean Protein Products. A List of Publications for 1963**
NORTH. UTIL. RES. DEVELOP. DIV.
U. S. Agr. Res. Serv., ARS-71-26-2, 2 pp. February 1964. [Processed]

1634 • **Chemically Modified Oil Products and Industrial Uses. A List of Publications and Patents for 1963**
NORTH. UTIL. RES. DEVELOP. DIV.
U. S. Agr. Res. Serv., ARS-71-27-2, 4 pp. February 1964. [Processed]

1635 • **Industrial Uses of Proteins. A List of Publications for 1963**
NORTH. UTIL. RES. DEVELOP. DIV.
U. S. Agr. Res. Serv., ARS-71-28-2, 1 p. February 1964. [Processed]

1636 • **Review Articles on Oilseed Crops Research. A List of Publications for 1963**
NORTH. UTIL. RES. DEVELOP. DIV.
U. S. Agr. Res. Serv., ARS-71-29-2, 2 pp. February 1964. [Processed]

1637 • **New Crops. A List of Publications and Patents for 1963**
NORTH. UTIL. RES. DEVELOP. DIV.
U. S. Agr. Res. Serv., ARS-71-19-2, 2 pp. March 1964. [Processed]

1638 • A New Type of Naturally Occurring Polyunsaturated Fatty Acid

K. L. MIKOLAJCZAK, C. R. SMITH, JR., M. O. BAGBY, and I. A. WOLFF

J. Org. Chem. 29(2):318-322. February 1964

The seed oil of *Crepis foetida* L., a member of the plant family Compositae, contains 60% of a fatty acid that has been shown to be *cis*-9-octadecen-12-ynoic acid. For convenience it is called crepenynic acid. This nonconjugated polyunsaturated acid is the first known member of a new class of naturally occurring acetylenic fatty acids, analogous to linoleic acid in containing methylene-interrupted unsaturation. The new compound may find considerable importance in mechanistic studies of fatty acid biosynthesis and of fatty acid metabolism. Crepenynic acid readily autoxidizes on standing. Two derivatives have been synthesized, *cis*-9,10-epoxyoctadec-12-ynoic and *threo*-9,10-dihydroxyoctadec-12-ynoic acids.

1639 • Growth and Pancreatic Hypertrophy of Rats Fed Commercial and Laboratory Soybean Meals and Hulls

A. K. SMITH, J. J. RACKIS, L. L. MCKINNEY, D. J. ROBBINS,[1] and A. N. BOOTH[1]
([1]West. Util. Res. Develop. Div., Albany, Calif.)

Feedstuffs 36(7):46-48. February 15, 1964

Factors in raw dehulled soybean meal responsible for poor growth and pancreatic hypertrophy in rats are readily inactivated by autoclaving the meal with live steam for as little as 15 minutes at atmospheric pressure.

Maximum weight gain and protein efficiency (PE) were obtained with soybean meals containing 19% moisture, after autoclaving at atmospheric pressure for 15 minutes. Autoclaving the meal as long as 2 hours had no further effect on PE. Average PE values of autoclaved soybean meals with an initial moisture level of 19% were nearly always higher than for 5% moisture meals. There were no significant differences in the nutritive value of several commercial soybean meals.

Casein diets containing 30% soybean hulls increased growth, decreased PE, and caused pancreatic hypertrophy when fed to rats.

1640 • Xanthation of Starch by a Continuous Process

C. L. SWANSON, T. R. NAFFZIGER, C. R. RUSSELL, B. T. HOFREITER, and C. E. RIST

Ind. Eng. Chem., Prod. Res. Develop. 3(1):22-27. March 1964

A rapid continuous procedure for making starch xanthates was developed to make additives suitable for improving strength properties of pulp and paper products. Starch xanthates having a degree of substitution (D.S.) from 0.07 to 0.47 were made in a small-scale continuous mixer-reactor system. Data were developed on the effect of mole ratios of starch, CS_2, and aqueous NaOH, order of addition, temperature, and discharge pressure on D.S., reaction efficiency, and power consumption. Starch xanthates were discharged as viscous pastes of 53 to 61% solids following 2-minute mixing. Conversion of CS_2 to xanthate was 87 and 80% complete, respectively, for starch xanthates of D.S. 0.07 and 0.17 analyzed within 10 minutes after discharge. In general, maximum efficiency is favored by increasing the temperature, adding CS_2 to starch before NaOH, increasing the NaOH-CS_2 ratio, and decreasing discharge orifice size.

1641 • Homogeneous Catalytic Hydrogenation of Sorbic Acid with Pentacyanocobaltate II

A. F. MABROUK, H. J. DUTTON, and J. C. COWAN

J. Am. Oil Chemists' Soc. 41(2):153-158. February 1964

The homogeneous hydrogenation of sodium sorbate, with pentacyanocobaltate II used as the catalyst, was followed manometrically at room temperature and atmospheric hydrogen pressure. One mole of hydrogen was absorbed by one mole of sorbate. UV and IR analyses demonstrated the reduction of sorbate to hexenoate. Gas-liquid chromatography (GLC) of hexenoate indicated 82, 17, and 1% yields of 2-, 3-, and 4-hexenoates, respectively, with traces of sorbate. Increasing either the period of hydrogenation or the ratio of catalyst to sorbate, or both, did not cause the formation of caproate or change the ratio of the three isomers. Homogeneous catalytic hydrogenation in methanolic solutions showed higher selectivity since 2-hexenoate was present in 96% yield.

To standardize GLC columns, hexenoic acid isomers were synthesized by the Knoevenagel condensation. *trans*-2-Hexenoic and *trans*-3-hexenoic acids were prepared in 75 and 85% yields by a condensation of *n*-butanal and malonic acid in the presence of pyridine and triethanolamine, respectively. *trans*-4-Hexenoic acid was prepared in 70% yield by condensing diethyl malonate with crotyl bromide. Physical properties, including UV and IR spectra, were determined for the purified synthetic acids and methyl esters.

Although the absolute specificity of attack at the 4,5-double bond of sorbic acid was not confirmed, the high degree of selectivity obtained does encourage further study of homogeneous catalysis on higher fatty acids.

1642 • Soybean Unsaponifiables: Chromatographic Investigation of Shell Drain Condensate from a Commercial Deodorizer

R. L. HOFFMANN, C. D. EVANS, and J. C. COWAN

J. Am. Oil Chemists' Soc. 41(2):116-119. February 1964

The shell drain condensate from a commercial soybean oil deodorizer was analyzed for nonpolar unsaponifiable constituents by liquid-liquid partition chromatography. A procedure for obtaining large quantities of these nonpolar constituents for flavor studies is described, and data on extraction techniques, purification, and analyses are presented. High-purity soy sterols can be obtained as a byproduct.

1643 • Use of Dicyclohexylethylamine in the Microscale Preparation of Phenacyl Derivatives of Carboxylic Acids

FRANK H. STODOLA

Microchem. J. 7(4):389-399. December 1963

A simple method of preparing phenacyl derivatives is described. It is based on the use of the sterically hindered base dicyclohexylethylamine as the proton acceptor. This method provides a short reaction time, mild conditions, high yields, avoidance of ester hydrolysis, and ease of micromanipulation.

1644 • Isolation of Four Soybean Trypsin Inhibitors by DEAE-Cellulose Chromatography

J. J. RACKIS and R. L. ANDERSON

Biochem. Biophys. Res. Commun. 15(3):230-235. March 1964

Soybean whey proteins have been resolved by DEAE-cellulose chromatography into four highly purified soybean trypsin inhibitors designated as SBTIA_1, A_2, B_1, and B_2. The inhibitors differ in respect to chromatographic behavior, physical-chemical properties, and antitrypsin activity.

1645 • Composition of Commercial Grades of Corn, Oats, and Grain Sorghums

J. E. HUBBARD, F. R. EARLE, and J. J. CURTIS, NORTH. UTIL. RES. DEVELOP. DIV.

U. S. Agr. Res. Serv., ARS-71-32, 20 pp. April 1964. [Processed]

Commercial samples of white corn, white oats, red oats, yellow milo, and white kafir were obtained from primary markets and analyzed for ash, protein, oil, sugar, and starch contents.

White corn was similar to yellow corn in composition except for pigments. Differences noted in the composition of the two types of corn may be related to varietal and location differences and not to color.

Oats were higher in protein, ash, and oil contents and lower in sugar and starch contents than corn. No. 1 red oats from Fort Worth, Texas, had a high oil content; this was probably associated with varieties.

Grain sorghums differed little in ash, protein, oil, sugar, and starch contents among grades, classes, and market locations although variations in composition from sample to sample were sometimes considerable. Grain sorghums were higher in protein content and lower in oil content than corn. They are, however, so similar to corn in composition that they can be used for feeding and for many industrial uses as a replacement for corn.

1646 • An Annular Cell for the Oxidation of Iodate

H. F. CONWAY and E. B. LANCASTER

Electrochem. Technol. 2(1-2):46-50. January-February 1964

Efficient continuous production of periodate is required for the production of dialdehyde starch. An annular cell that meets the requirements of efficiency, capacity, stability, and long life is described. Data are presented showing the effect on cell performance of several important variables. In the operation of the annular cell, a critical minimum flow rate of material to be oxidized is essential. Neither temperature nor pH in the operating range affects current efficiency. Although the quality of the anode surface was noted as a major variable, it could not be evaluated.

1647 • Experience with the In-Cell Process for the Periodate Oxidation of Starch

H. F. Conway, E. B. Lancaster, and V. E. Sohns

Electrochem. Technol. 2(1-2):43-46. January-February 1964

In-cell oxidation of starch to dialydehyde starch by electrolytically generated periodic acid is a pseudoelectroorganic reaction. Possible reactions of starch and dialdehyde starch with components of the reaction mixture under conditions in the cell are reviewed. The mechanical features of the cell that influence starch oxidation and the engineering problems encountered in the initial pilot-scale production are discussed.

1648 • Storage Stability of Hydroxyethylated Flour and Starch

J. C. Rankin, J. G. Rall, C. R. Russell, and C. E. Rist

Cereal Chem. 41(2):111-121. March 1964

The effect of storage in closed containers at room temperature on the properties of hydroxyethylated wheat flour, high-amylose starch, and normal corn starch was investigated. Stability of these products for a year was determined by periodic testing of their paste viscosity, clarity, and pH, as well as moisture, nitrogen, sugar, and ethylene oxide contents. Appropriate test data were correlated with such preparative factors as degree of substitution, alkali-catalyst concentration, pH, and moisture content. Correlations showed that the hydroxyethylated products were completely stable in a pH range of 4 to 10. Products stored at pH values above 10 had varying degrees of instability. From the viscosity values at various time intervals, a general equation of the point-slope type was developed which permits the relative stability of various samples to be judged from their slope factor, termed index of change, and their initial viscosity. The variations in paste viscosity indicated that changes were taking place in the modified starch and protein constituents. Increasing substitution of ethylene oxide and lowering moisture content were effective stabilizing influences.

1649 • A Micro Method for Determining Moisture Distribution in Wheat Kernels, Based on Iodine Staining

H. L. Seckinger, M. J. Wolf, and R. J. Dimler

Cereal Chem. 41(2):80-87. March 1964

A method is described for studying moisture distribution in wheat based on comparison microscopically of the starch-iodine color of isolated portions of endosperm with that of standards. Moisture content of a few endosperm cells was estimated to 1 percentage point over the range 12 to 21%. Application of the procedure to wheat during tempering showed that an increase in moisture could be detected in the center of the kernel after 2 hours. At 24 hours, moisture was evenly distributed throughout the endosperm. Sections cut from a single kernel after a 2-hour tempering showed a moisture gradient of 4 percentage points over a distance of 1 mm.

1650 • An Interesting Species of *Mucor*, *M. ramosissimus*

C. W. Hesseltine and J. J. Ellis

Sabouraudia 3:151-154. February 1964

Mucor ramosissimus, isolated in Uruguay from a case of chronic, destructive phycomycosis, is described from culture, and a neotype strain is designated. Its colonies are low, its short sporangiophores are repeatedly branched sympodially, its sporangial walls are persistent, and many of its sporangia are devoid of columellae. A comparison is made with other species of *Mucor.*

1651* • Wheat Starch. Isolation

M. J. WOLF

"Methods in Carbohydrate Chemistry," vol. IV, ed. R. L. Whistler, pp. 6-9. New York. 1964

The gluten-washing procedure for preparation of starch from both flour and wet-ground wheat is described. Recovery of small starch granules is improved by centrifuging at relative centrifugal forces between 1,500 and 2,300 X G.

1652* • X-Ray Analysis of Starch Granules

HENRY F. ZOBEL

"Methods in Carbohydrate Chemistry," vol. IV, ed. R. L. Whistler, pp. 109-113. New York. 1964

Native granular starches give x-ray diffraction patterns that have been classified as A, B, and C. A fourth type, the V pattern, arises from complexes formed by amylose with a variety of polar organic molecules. A table of x-ray patterns gives "d" spacings and their corresponding reflection angle (2Θ) to identify readily starch patterns obtained by either film or diffractometer methods. Emphasis is placed on techniques applied to the use of a diffractometer.

1653* • Determination of Optical Rotation. For Determination of Concentration and Starch Content of Corn

R. J. DIMLER

"Methods in Carbohydrate Chemistry," vol. IV, ed. R. L. Whistler, pp. 133-139. New York. 1964

The optical rotation properties of starch and its amylose and amylopectin components are discussed briefly. The application of rotation to the determination of starch concentration in a solid material is illustrated by a description of a procedure for determining starch in corn with the calcium-chloride dispersion technique.

1654* • Improving Reactivity [of Starches] with Liquid Ammonia

J. E. HODGE

"Methods in Carbohydrate Chemistry," vol. IV, ed. R. L. Whistler, pp. 279-281. New York. 1964

The procedure is given of Hodge, Karjala, and Hilbert (J. Am. Chem. Soc. 73:3312, 1951) for isolating free-flowing starch granules from liquid ammonia suspensions in a partially disorganized, reactive state. This procedure is most frequently used to prepare starch for pasting and subsequent fractionation at temperatures below 100°C.

1655* • Improving Reactivity [of Starches] with Pyridine

J. E. HODGE

"Methods in Carbohydrate Chemistry," vol. IV, ed. R. L. Whistler, pp. 281-282. New York. 1964

The procedure is given of Lohmar, Sloan, and Rist (J. Am. Chem. Soc. 72:5717, 1950) wherein corn starch granules are made reactive for esterification by heating in refluxing pyridine at 115°C. for 1 hour.

1656* • Carbanilates. Reaction of Starch with Aryl Isocyanates

IVAN A. WOLFF

"Methods in Carbohydrate Chemistry," vol. IV, ed. R. L. Whistler, pp. 301-303. New York. 1964

Detailed laboratory instructions are given on the preferred procedure for carbanilation of starch. Several generalizations and pertinent references are included concerning the reaction of starch with aryl isocyanates.

1657* • Dialdehyde Starch. Sodium Periodate Oxidation of Cornstarch

C. L. MEHLTRETTER

"Methods in Carbohydrate Chemistry," vol. IV, ed. R. L. Whistler, pp. 316-317. New York. 1964

Periodate-oxidized starch, called dialdehyde starch for convenience, is quite reactive, can be quantitatively reduced by hydrogen, and is completely complexed with sodium bisulfite. Temperature, time, solvent, pH, and concentration of oxidant all affect the course of periodate oxidations. A procedure is given for the oxidation of corn starch by sodium periodate to yield 95 to 100% of theory.

1658 • Oxazolidinethiones and Volatile Isothiocyanates in Enzyme-Treated Seed Meals from 65 Species of Cruciferae

M. E. DAXENBICHLER, C. H. VANETTEN, F. S. BROWN, and QUENTIN JONES[1]

([1]USDA Crops Research Div., Beltsville, Md.)

J. Agr. Food Chem. 12(2):127-130. March-April 1964

Information is unavailable concerning the amounts and types of isothiocyanate-yielding glucosides in many species of Cruciferae seeds. Because such compounds have nutritional significance, a number of unreported species were investigated. Information about the parent thioglucosides was obtained by estimation of the oxazolidinethione and steam-volatile isothiocyanate contents of enzymatic hydrolyzates of the seed meals. Significant amounts of oxazolidinethione were found in hydrolyzates from 11 species not previously known to contain such glucosidic precursors. Oxazolidinethione (calculated as vinyl oxazolidinethione) measurements ranged from 0 to 19.3 milligrams per gram of pentane-hexane-extracted meal. Total volatile isothiocyanate measurements (calculated as butenyl isothiocyanate) ranged from 0 to 21.6 milligrams per gram of pentane-hexane-extracted seed meal. Probable identification of the predominant volatile isothiocyanates produced in some of the hydrolyzates was obtained by paper chromatography of their thiourea derivatives.

1659 • Homogeneous Catalytic Hydrogenation of Unsaturated Fats: Iron Pentacarbonyl

E. N. FRANKEL, HELEN M. PETERS, E. P. JONES, and H. J. DUTTON

J. Am. Oil Chemists' Soc. 41(3):186-191. March 1964

Iron pentacarbonyl is an effective homogeneous catalyst for the reduction of polyunsaturated fats. Hydrogenation of soybean oil and its methyl esters has been achieved at 180°C., hydrogen pressures of 100 to 1,000 p.s.i., and 0.05 to 0.5 molar concentrations of catalyst. Analyses of partially reduced products show considerable isomerization of double bonds, reduction of linolenate and linoleate with little or no increase in stearate, and accumulation of *cis,trans-* and *trans,trans*-conjugated dienes, and isolated *trans* monoenes. The unreduced trienes include diene conjugated fatty esters. The nonconjugated dienes contain large amounts of *trans* and nonalkali conjugatable unsaturation. Considerable scattering of double bonds is evident in different fractions between the C_4 and C_{16} positions. Complex formation between iron carbonyl and unsaturated fats is also indicated.

The course of homogeneous hydrogenation catalyzed by iron pentacarbonyl appears similar to the heterogeneous catalytic reaction. Metal carbonyls are well known for their isomerizing effects and their ability to form stable complexes with olefins. These homogeneous complexes provide suitable model systems to study the mechanism of catalytic hydrogenation of fats.

1660 • Search for New Industrial Oils. VIII. The Genus *Limnanthes*

R. W. MILLER, M. E. DAXENBICHLER, F. R. EARLE, and H. S. GENTRY[1]
([1]USDA Crops Research Div., Beltsville, Md.)

J. Am. Oil Chemists' Soc. 41(3):167-169. March 1964

Seed oils from most of the known species and varieties of *Limnanthes* were analyzed for their fatty acid content. Each contained at least 95% of acids with more than 18 carbon atoms. The major component acid, *cis*-5-eicosenoic, ranged from 52 to 77% of the acids present. Seeds of all species examined contained thioglucosidic precursors of volatile isothiocyanates, liberated by the action of mustard seed enzymes on the meal. One species also yielded a small amount of an oxazolidinethione-like compound of the type associated with enzyme-treated rapeseed meal.

1661 • Monitoring Countercurrent Distribution with a Recording Refractometer

R. O. BUTTERFIELD and H. J. DUTTON

Anal. Chem. 36(4):903-906. April 1964

Deterrents to greater use of countercurrent distribution apparatus are the labor and time required for determining weight distribution. These usually can be eliminated by using a sensitive differential recording refractometer to monitor effluents either (a) as they are discharged to the fraction collector or (b) as they are reintroduced to the first tube of the train during the recycle operation.

Under (a), the single withdrawal operation, one has a concentration versus volume curve immediately available to integrate for analysis or to guide the combination of tubes for preparative purposes. Under (b), the "recycle" operation, one can observe the progress of fractionation of solutes, determine the maximum length of recycle, and decide when a conversion to single withdrawal is desirable. Necessary servo-, pumping, and control mechanisms, which automatically change the refractometer range, transport solutions, and program operations, are described.

1662 • Glycosidic Constituents of *Ipomoea parasitica* Seed

C. R. SMITH, JR., L. H. NIECE, H. F. ZOBEL, and I. A. WOLFF

Phytochemistry 3(2):289-299. March 1964

The seeds of *Ipomoea parasitica* (HBK) Don. contain unique members of a class of glycolipids found in the plant family Convolvulaceae. They were shown to consist of acylated glycosides of (+)-11-hydroxyhexadecanoic acid. The acyl groups were removed by alkaline hydrolysis and obtained as α-methylbutyric acid. Three sugars were liberated by acid hydrolysis: D-fucose, 6-deoxy-D-glucose (D-quinovose), and another tentatively identified as a 6-deoxygulose. These glycosides differ from others in Convolvulaceae in yielding this tentatively identified sugar, and also in containing neither D-glucose nor L-rhamnose. For the first time it was shown that different sugars can be released quite selectively from a convolvulaceous glycoside by graded acid hydrolysis. On the basis of these hydrolyses, a tentative structure for the glycosidic units is proposed.

1663 • Air Classification of Kansas Hard Red Winter Wheat Flours

A. C. STRINGFELLOW and A. J. PEPLINSKI

Northwest. Miller 270(6):19-20, 22. March 1964

Flours from five varieties of Kansas hard red winter wheat were evaluated for response to fractionation by fine grinding and air classification. Their response was, in order: Bison (highest), Triumph, Wichita, Comanche, and Pawnee (lowest). A range of fractions containing 4.7 to 31.7% protein was obtained from Bison flour; the lowest range, 4.9 to 22.1% protein, was from Pawnee. The lowest protein (4.3%) fraction came from Triumph flour.

1664 • Low-Protein Fractions from HRW Wheat Flour

A. C. Stringfellow and V. F. Pfeifer

Cereal Sci. Today 9(4):103-104, 106, 150. April 1964

Fractionation of hard red winter wheat (HRW) flours by fine grinding and air classification ordinarily yields low-protein fractions containing from 5.0 to 9.0% protein; whereas flour fractions to be used as starch replacements should have substantially less protein than that. A long patent flour, containing 13.1% protein and milled from Wichita HRW wheat, was fractionated to yield 70% of the flour as a low-protein (8.1%) fraction. This fraction was then dried, moistened, heated, defatted, or treated with either a gas or an enzyme before regrinding and reclassification. In addition, variations in intensity of regrinding were also studied. These treatments were attempts to lower the protein content to a level suitable for industrial utilization. Only intensified grinding and reduction in moisture content before regrinding increased fractionation efficiency above that of the control procedure. All other treatments were either ineffective or deleterious to fractionation efficiency. With the most intensive regrinding, a fraction was separated containing 5.3% protein and amounting to 57% of the original long patent flour, or 81% of the fraction subjected to reprocessing.

1665 • A Preliminary Report on a Perfect Family of Exclusively Protosexual Yeasts

Lynferd J. Wickerham

Mycologia 56(2):253-266. March-April 1964

A new genus, *Chlamydozyma*, is the type for a new family of yeasts based on protosexual reproduction, a primitive type of sexuality that is believed to have originated in the viruses and bacteria and to have given rise to classical forms of sexuality in the fungi. This genus consists of heterothallic species in which sexual reactions are made strong by two sexual agglutination mechanisms. The species hybridize with each other and with a closely related genus of parasitic ascomycetes.

1666 • The Structure of Isomaltol

B. E. Fisher and J. E. Hodge

J. Org. Chem. 29(4):776-781. April 1964

Isomaltol is shown to be 3-hydroxy-2-furyl methyl ketone. Isomaltol *O*-methyl ether was ammonolyzed to produce both a pyrrole (3-methoxy-2-pyrrolyl methyl ketone) and a pyridine derivative (4-methoxy-2-methyl-3-pyridinol). Removal of the *O*-methyl group of the pyridinol gave the same 3-hydroxy-2-methyl-4-(1*H*)-pyridone that was obtained by ammonolysis of maltol *O*-methyl ether (3-methoxy-2-methyl-4*H*-pyran-4-one) to 3-methoxy-2-methyl-4-(1*H*)-pyridone, followed by removal of the *O*-methyl group. Oxidative degradation of the acetyl side chain of isomaltol *O*-methyl ether gave 3-methoxy-2-furoic acid, which was decarboxylated to the known 3-methoxyfuran. The acidity of isomaltol is attributed to a carboxylic acid-like resonance that extends from the carbonyl group to the enolic hydroxyl group and that diminishes the aromaticity of the furan nucleus. The infrared spectra indicate isomaltol to be strongly hydrogen bonded as a dimer in the crystalline state, and possibly also as a dimer, or intramolecularly, in organic solvents.

1667 • Stimulation of Carotenogenesis by Microbial Cells

A. Ciegler, Z. Pazola, and H. H. Hall

Appl. Microbiol. 12(2):150-154. March 1964

Spent mycelia of *Blakeslea trispora* recovered from a previous fermentation enhanced carotene production by mated cultures of the same organism. Peak yields of 107 to 142 milligrams of carotene per 100 milliliters of medium were achieved in 6 days. Beta-carotene constituted 92% of the total carotenoids produced. Part of the activity of the enhancing substance, present in an aqueous extract of the mycelium, was due to an organic acid fraction. Other microbial cells, molds, yeasts, and bacteria are also capable of enhancing carotene production.

1668 • Micro-Organisms: What They Are, Where They Grow, What They Do

C. R. Benjamin, W. C. Haynes, and C. W. Hesseltine

U. S. Dept. Agr., Misc. Pub. No. 955, 36 pp., May 1964

This bulletin reviews the major groups of microorganisms: viruses, bacteria, actinomycetes, algae, protozoa, lichens, and fungi. Under each is discussed the number of species, their general occurrence in nature, an authoritative reference in the literature, their salient characteristics, and their economic uses. Also covered is the relationship of taxonomy of microorganisms to technology, the sources of pure cultures, and their maintenance. The bulletin discusses for the nonspecialist the matter of naming and classifying microorganisms.

1669 • Behaviour of Polyelectrolytes in Ultracentrifugal Molecular Weight Determinations. I. Extrapolation of Data

Stig R. Erlander and F. R. Senti

Makromol. Chem. 73:14-30. April 1964

The molecular weight of bovine serum albumin (BSA) was obtained from sedimentation equilibrium in trichloroacetic acid and hydrochloric acid at pH 3.8, in 0.0005 *M* salt (sodium chloride, sodium trichloroacetate, and sodium thiocyanate) plus sulfuric acid at pH 3.2 and in 0.1 *M* sodium chloride plus hydrochloric acid at pH 1.8. The extrapolated weight-average molecular weights of BSA were within the range of light-scattering values reported in the literature. The binding coefficient Γ is approximately equal to the electrostatic charge Z at all pH values studied. The constant value of Γ with a change in Z can be explained by assuming that about 50 carboxylate groups have abnormally low pK values and are paired with the cationic groups of BSA. Binding of salt by the cationic groups occurs only after titration of the carboxylate ions. The extrapolated molecular weight in the absence of salt is not equal to the polymer molecular weight divided by $(1 + Z)$. In addition, it was concluded that the reciprocal of the apparent molecular weight may be plotted against $(C_a + C_b)/2$ instead of $(hC_a + C_b)/2$ (where $h = (B\overline{M}_w)_a/(B\overline{M}_w)_b$) if h_nC does not influence C_b appreciably, i.e., when comparatively high rotational speeds are used. The experimental data obtained from the cell bottom indicate that the concentration coefficient obtained from the apparent Z-average molecular weight is $2(\overline{M}_w/\overline{M}_z)$ times as large as that obtained from the apparent weight-average molecular weight.

1670 • Behaviour of Polyelectrolytes in Ultracentrifugal Molecular Weight Determinations. II. The Concentration Coefficient B

Stig R. Erlander and F. R. Senti

Makromol. Chem. 73:31-47. April 1964

An approximate form can be assumed for the concentration coefficient B in ultracentrifugal molecular weight determinations. By employing the electrostatic charge obtained from titration studies, this approximate form of the B coefficient predicts a value which is considerably higher than the experimental value for bovine serum albumin (BSA). This discrepancy suggests that the electrical potential term cannot be zero and, hence, that BSA must possess permanent or induced polarization or both. A dipole moment of approximately 1400 Debye units was calculated for BSA by employing into the B coefficient a simplified model given by Edsall and Wyman (Biophysical Chemistry, vol. I, chap. 5 and 6, New York, 1958). This compares favorably with a dipole moment of 760 units obtained from the dielectric constant of BSA. The (dC_r/rdr) versus C_r curves for BSA were examined for solutions containing a small amount of salt plus acid or for solutions containing the acid alone. When only the acid is present (hydrochloric or trichloroacetic), the concentration coefficient B_r appears to decrease as the cell radius r increases. This decrease in B_r with r is accompanied by an increase in the total coefficient B which is a function of the initial polymer concentration. The most plausible explanation for this decrease in B_r with r is that the hydronium ion concentration decreases with r due to greater binding of the acid anion at the meniscus. This change in pH with r decreases the value of BSA's electrostatic charge Z with cell radius. Thus the value of B_r decreases with r because of a corresponding decrease in the positive term $-(Z/M)(C_R/dC_P)$ and an increase in the absolute value of the negative dipole moment term. The latter term decreases with an increase in r because of a corresponding increase in the number of zwitterions on BSA. Calculations show that the total coefficient B will be increased three- or fourfold for a difference in charge of $(Z_b\text{-}Z_a) = -0.04$, because the coefficient of $d(Z'/M')/dC_P$ is also negative. A small amount of salt (0.0005 molar) eliminates this decrease in B_r and increase in B.

1671 • Report of Second National Conference on Wheat Utilization Research

Sponsored by National Association of Wheat Growers; Great Plains Wheat, Inc.; Western Wheat Associates, Inc.; Western and Northern Utilization Research and Development Divisions and other agencies of the U. S. Department of Agriculture at Peoria, Ill., October 28-30, 1963

North. Util. Res. Develop. Div.
U. S. Agr. Res. Serv., unnumb. pub., 247 pp. March 1964

This report contains either the complete text or summaries of all talks that were given. The conference provided a common meeting ground where various groups interested in wheat utilization presented information to promote the wider use of wheat and wheat products. General areas covered by one or more presentations included programming of research on grain and industrial utilization; economics of domestic and foreign markets for wheat and wheat products; wheat and flour quality evaluation, microbiology, and radionuclide content; improvements in processing wheat grain, flour, and starch by conditioning, air classification, chemical and enzymatic modification, and radiation sterilization; effects of treatments on chemical constituents, physical properties, and nutritive value; and development of new or improved wheat-based foods.

1672 • Specific, Soluble Factor Involved in Sexual Agglutination of the Yeast *Hansenula wingei*

Neil W. Taylor

J. Bacteriol. 87(4):863-866. April 1964

In some species of yeasts, unisexual mating types agglutinate strongly and specifically with opposite mating types of the same species. When mating type 5 of *Hansenula wingei* was digested with snail gut enzymes, a soluble factor was found in the digest which behaved like the type 5 cells in that it (1) specifically agglutinated the opposite mating type, (2) adsorbed only on the opposite mating type, and (3) was inactivated by mercaptoethanol.

1673 • The Occurrence of 6,9,12,15-Octadecatetraenoic Acid in *Echium plantagineum* Seed Oil

C. R. Smith, Jr., J. W. Hagemann, and I. A. Wolff

J. Am. Oil Chemists' Soc. 41(4):290-291. April 1964

Seed oil of *Echium plantagineum,* a member of the borage family, contains two polyunsaturated fatty acids not commonly found in vegetable oils: all-*cis* 6,9,12-octadecatrienoic acid and all-*cis* 6,9,12,15-octadecatetraenoic acid. Before their discovery in the Boraginaceae, nonconjugated tetraenoid acids were not known to occur in oils of higher plants.

1674 • Search for New Industrial Oils. IX. *Cuphea*, a Versatile Source of Fatty Acids

R. W. Miller, F. R. Earle, I. A. Wolff, and Q. Jones[1]

([1]USDA Crops Research Div., Beltsville, Md.)

J. Am. Oil Chemists' Soc. 41(4):279-280. April 1964

Seed oils from five species of *Cuphea* show three distinct patterns of fatty acid composition. *C. hookeriana* and *C. painteri* oils contain about 70% caprylic acid, *C. ignea* and *C. llavea* oils have more than 80% capric acid, and *C. carthagenensis* oil contains 57% lauric and 18% capric acids.

1675 • Partial Hydrogenation and Winterization of Soybean Oil

C. D. Evans, R. E. Beal, D. G. McConnell, L. T. Black, and J. C. Cowan

J. Am. Oil Chemists' Soc. 41(4):260-263. April 1964

Soybean oil was hydrogenated under selective and nonselective conditions to give products with iodine values (I.V.) ranging from 85 to 115. The products were crystallized at 8°C. and examined for yield, stability, and fatty acid composition of the winterized oil. Changes in fatty acid composition, formation of *trans* acids, and yield of winterized oil are approximately linear with the degree of hydrogenation. Stearine fractions, which are 15 to 20 I.V. units lower than winterized oil, were further crystallized in solvents to give liquid oils and hard stearines.

1676* • Wheat Flour Fractionation Studies

V. F. Pfeifer, R. J. Dimler, and J. W. Pence[1]
([1]West. Util. Res. Develop. Div., Albany, Calif.)

Can. Baker 76(9):18-22, 36. September 1963

Fine grinding and air classification of cereal flours are being studied at the Northern Division to reveal their potential for making fractions available that have improved usefulness in industrial, food, feed, and fermentative outlets.

Fractions suitable for industrial uses, containing 3% protein or less, were separated from most soft wheat flours; the low-protein fractions from hard wheat flours, however, usually contained from 5 to 8% protein. Premilling treatments of hard wheats and reprocessing the low-protein fractions only reduced the protein content slightly. Almost all the flours tested, whether from hard or soft wheats, yielded fractions containing 20% protein or higher.

Baking tests on flours and fractions from hard and soft wheats from the Pacific Northwest were carried out by the Western Division. These tests indicated how fractionation can be employed to increase the utility of such flours in baking bread, cakes, and cookies.

1677 • Tempeh Fermentation: Package and Tray Fermentations

Alcides Martinelli, Filho and C. W. Hesseltine

Food Technol. 18(5):167-171. May 1964

Tempeh is made in a primitive fashion in Indonesia by wrapping dehulled and cooked soybeans in banana leaves, inoculating with a mixed culture of *Rhizopus* and other microorganisms, and allowing them to ferment for about 2 days. Methods were devised to make tempeh rapidly in large amounts by pure-culture fermentations in shallow wooden and metal trays with perforated bottoms and covers. Excellent tempeh was also made in perforated plastic bags and tubes. Such containers are especially good because after the inoculum is introduced the soybeans can be fermented in the package. All fermentations were completed in 24 hours at 31°C.

1678 • Reduction and Starch-Gel Electrophoresis of Wheat Gliadin and Glutenin

J. H. Woychik, F. R. Huebner, and R. J. Dimler

Arch. Biochem. Biophys. 105(1):151-155. April 1964

Reduction of the disulfide bonds of wheat gliadin and glutenin followed by electrophoresis in starch gel revealed the presence of some components which are perhaps common to both proteins. There were marked quantitative differences in the distribution of components. The release of 20 or more electrophoretic components from the previously unresolved glutenin fraction is further evidence that extensive intermolecular disulfide bonding is responsible for its high molecular weight. Intermolecular disulfide bonding is present only to a limited extent in the gliadin fraction.

1679 • Brassylic Acid Esters as Plasticizers for Poly(Vinyl Chloride)

H. J. Nieschlag, J. W. Hagemann, I. A. Wolff, W. E. Palm,[1] and L. P. Witnauer[1]

([1]East. Util. Res. Develop. Div., Philadelphia, Pa.)

Ind. Eng. Chem., Prod. Res. Develop. 3(2):146-149. June 1964

Twenty diesters of brassylic (tridecanedioic) acid were prepared and evaluated as plasticizers for poly(vinyl chloride). Data on several of the brassylates indicate that they are excellent low-temperature plasticizers with exceptional light stability. Brassylic acid can be derived via oxidative ozonolysis from the erucic (*cis*-13-docosenoic) acid present (55 to 60%) in oil from crambe, a potential new oilseed crop under investigation by the U.S. Department of Agriculture.

1680 • Taxonomic Studies of *Streptomyces griseus* (Krainsky) Waksman et Henrici: A Species Comprising Many Subspecies

Thomas G. Pridham

"Antimicrobial Agents and Chemotherapy—1963," ed. J. C. Sylvester, pp. 104-115, Ann Arbor, Michigan, 1964. Proc. 3rd Interscience Conf. on Antimicrobial Agents and Chemotherapy, Am. Soc. Microbiol., Washington, D.C., October 28-30, 1963.

The best way to handle streptomycete classification, nomenclature, and identification is through application of a genus-species-subspecies concept. To establish a species, principal criteria are morphology of chains of spores and nature of spore-wall surfaces. Subspecies can be differentiated one from another through application of other criteria, such as chromogenicity, colors of sporulating aerial mycelium and of vegetative mycelium, carbon utilization patterns, and assessment of qualitative production of antibiotics and of sensitivity and resistance to antibacterial antibiotics. Application of the genus-species-subspecies concept leads to the identification of any streptomycete with flexuous chains of spores that are smooth-walled like *Streptomyces griseus*. The neotype strain of the species is IMRU 3326, the 1915 isolate of Waksman and Curtis.

A literature study indicated that more than 200 "species" and "subspecies" probably have at least the two characteristics cited for *S. griseus*. Classical taxonomic procedures allow the separation of strains of *S. griseus* into a number of groups. Precise information on relationships of strains and antibiotics promises objective clarification of subspecific status of many strains.

1681 • Effect of Electrolytes on the Interaction Between Zinc Oxide and Titanium Dioxide

L. H. Princen

Offic. Dig., Federation Soc. Paint Technol. 36(473):648-663. June 1964

The interaction between zinc oxide and titanium dioxide was studied by sedimentation volume experiments in alcohol-water mixtures. The volume of the mixed oxides over the values calculated from the individual pigment volumes, assuming no interaction, increases with increasing water content. Sodium chloride solution up to a concentration of 0.2 *M* does not affect the normal pH increase and the viscosity build-up in suspensions of pigment mixtures. Borate buffers at pH values of 9.1 and 9.8 do not change the rheological behavior of the suspensions, but do affect their pH. Addition of phosphate buffer of pH 7.0 produces an entirely different effect due to strong adsorption of the phosphate ion on the pigments. Adsorption data are in agreement with the rheological behavior of the pigment suspensions. The complexity of the systems studied makes a theoretical evaluation extremely difficult.

1682 • Exocellular Bacterial Polysaccharide from *Xanthomonas campestris* NRRL B-1459. Part III. Structure

J. H. Sloneker, Danute G. Orentas, and Allene Jeanes

Can. J. Chem. 42(6):1261-1269. June 1964

Application of periodate oxidation techniques to polysaccharide B-1459 has established the sequence of constituent sugar units and the linkage between units, as well as the optical configuration (β) of most of the linkages. Two-thirds of the D-mannose units are substituted at C_2 by D-glucuronic acid, and one-third are linked as a terminal side-chain residue. One-third of the D-glucose and a significant quantity of the D-glucuronic acid units are inert to vigorous periodate oxidation and may bear side-chain residues. The remainder of these units, which are oxidized by periodate, are substituted at C_4. Two-thirds of the D-glucose units are in pairs linked β-1,4. The pyruvic acid linkage in the polysaccharide was established as a 4,6-*O*-carboxyethylidene ketal attached to a terminal D-glucose side-chain residue. Structure of the polysaccharide is discussed in relation to its anomalous viscosity behavior in salt solutions.

1683 • Infection of *Popillia japonica* Newman Larvae with Vegetative Cells of *Bacillus popilliae* Dutky and *Bacillus lentimorbus* Dutky

THOMAS G. PRIDHAM, GRANT ST. JULIAN, JR., GORDON L. ADAMS, HARLOW H. HALL, and RICHARD W. JACKSON

J. Insect Pathol. 6(2):204-213. June 1964

A method is described for determining the infectivity of strains of *Bacillus popilliae* and *B. lentimorbus,* injected as vegetative cells into larvae of the Japanese beetle, *Popillia japonica* Newman. The results suggest that considerable strain variation occurs with regard to infectivity. The physiological state of the microorganisms before injection appears to have an important bearing on infectivity.

1684 • New Enzymatic Process Converts Mustard Seed to Valuable Meal and Oil Components

G. C. MUSTAKAS

Chemurgic Dig. 22(1):5-6. January-February 1964

Under USDA's program of screening new crops for commercial development, oriental mustard was reported as having favorable utilization aspects and agronomic prospects. Its establishment as a commercial crop for oil and portein meal, however, has only recently been considered by U.S. industry in areas where there are surplus crops and where mustard seed meal could furnish an economical source of protein for livestock feeds. Based on the new low-cost method described for commercial processing of mustard seed, a new industry and a profitable new farm crop in this country could evolve.

1685 • New Crop Prospects: Paper from Annual Plant Sources

IVAN A. WOLFF

Chemurgic Dig. 22(3):3-4. April-May 1964

Substantial amounts of crop land would be involved if the acreage were used to produce annual plants for pulp and papermaking; hence, research on pulp fiber crops is attractive. Technical adequacy, economic feasibility, and practicality of growth, harvest, transportation, storage, and handling, however, all taken together comprise the things that are absolutely essential to know and solve before a practical venture based on annual pulp crops can be undertaken.

1686 • Tempeh: Nutritive Value in Relation to Processing

A. K. SMITH, J. J. RACKIS, C. W. HESSELTINE, MABEL SMITH, DOROTHY J. ROBBINS,[1] and A. N. BOOTH[1]

(West. Util. Res. Develop. Div., Albany, Calif.)

Cereal Chem. 41(3):173-181. May 1964

Tempeh, an Indonesian food of good flavor and texture, is made by fermenting soybeans with a species of *Rhizopus.* The fermented food is high in protein and unsaturated oil. Rats fed tempeh showed a small reduction in growth and protein efficiency compared with autoclaved and dehulled full-fat soybean meal. This reduction in nutritive value may not be serious when one considers the improved edibility of soybeans for human consumption by fermentation. Loss of solids and protein in dehulling, soaking, washing, and cooking of soybeans before fermentation did not reduce the nutritive value of either cotyledons or full-fat grits (chips) used to make tempeh. Since pancreatic hypertrophy did not occur in rats fed tempeh, the heat used in normal preparation of tempeh is sufficient to destroy the factors in raw soybeans responsible for poor growth and pancreatic hypertrophy. Methionine supplementation of tempeh significantly increased rate of rat growth and protein efficiency values.

1687 • Physical Properties of Films from Dimethyl Sulfoxide-Pretreated Amylomaize Starches

A. M. Mark, W. B. Roth, C. L. Mehltretter, and C. E. Rist

Cereal Chem. 41(3):197-199. May 1964

Predispersion of various amylomaize starches in dimethyl sulfoxide, followed by quantitative recovery of the starch by precipitation in a lower alcohol, yields an intermediate product which, while alcohol-wet, becomes soluble in water at temperatures well under 100°C. Intrinsic viscosity determinations on films prepared from aqueous dispersions of the pretreated starch indicate that no hydrolytic degradation takes place throughout the over-all process. Dry tensile strength and other mechanical properties of the films compare favorably with those of films prepared from amylose fractionated from corn starch.

1688 • The Reversible Interaction of Sodium Dodecyl Sulfate with Bacterial Chromatophores

Jack W. Newton

J. Biol. Chem. 239(5):1585-1588. May 1964

Sodium dodecyl sulfate reacts with bacterial chromatophores, clarifies the particle preparation, and appears to destroy the pigment system with loss of photochemical activity. When suspended in media of high ionic strength, such preparations regain disulfide photoreduction activity and the infrared absorption bands of bacteriochlorophyll. These results show that the changes which take place in the particles on treatment with detergent are at least partially reversible.

Chromatophores that have first been preincubated in the light with an electron donor system are protected from detergent inhibition.

1689 • Search for New Industrial Oils. X. Seed Oils of the Calenduleae

F. R. Earle, K. L. Mikolajczak, I. A. Wolff, and A. S. Barclay[1]

([1]USDA Crops Research Div., Beltsville, Md.)

J. Am. Oil Chemists' Soc. 41(5):345-347. May 1964

Seed oils from 29 species in 5 genera of the tribe Calenduleae, family Compositae, have been examined to determine the distribution of dimorphecolic acid (9-hydroxy-*trans*-10,*trans*-12-octadecadienoic acid) among the close relatives of *Dimorphotheca*. Dimorphecolic acid occurs in all 5 of the *Dimorphotheca* species analyzed, in *Castalis nudicaulis*, and in 5 species of *Osteospermum* in amounts ranging from 34 to 75% of the oil. In all other species of the tribe analyzed to date, including 14 species of *Osteospermum*, 2 of *Calendula*, and 2 of *Chrysanthemoides*, the oil contained conjugated trienoic acids ranging from 14 to 60%.

1690 • Mustard Seed Processing: Simple Methods for Following Heat Damage to Protein Meals

J. E. McGhee, L. D. Kirk, and G. C. Mustakas

J. Am. Oil Chemists' Soc. 41(5):359-362. May 1964

Processed mustard seed contains a considerably higher content of reducing sugar than other oilseeds. During processing, the natural reducing sugar is supplemented with glucose released by enzyme hydrolysis of the thioglucoside, and the total content reaches a value of more than 3% of the defatted mustard meal. This quantity of reducing sugar in mustard seed is three times more than that in soybean meal. Consequently, the browning reaction, which degrades protein, presents a greater problem in processing oilseeds containing thioglucosides than oilseeds free of them. In developing the processing of mustard seed, the degree of heat treatment given the protein meals had to be determined. Several indirect methods were developed for following the effects of heat treatment on protein quality. Nitrogen solubility index, optical density of aqueous extracts, and reducing sugar content correlated well with degradation of heat-labile amino acids, such as lysine, arginine, and histidine, and gave an index of protein quality.

1691 • Chromatographic Separation of *cis* and *trans* Fatty Esters by Argentation with a Macroreticular Exchange Resin

E. A. Emken, C. R. Scholfield, and H. J. Dutton

J. Am. Oil Chemists' Soc. 41(5):388-390. May 1964

Methyl oleate and methyl elaidate, as well as other monoene *cis* and *trans* isomers of fatty esters, can be separated quickly and conveniently by a preparative chromatographic procedure in which a silver-saturated ion-exchange resin is used. Separations are based on differences in stabilities of the silver-olefin complexes. Recoveries of better than 95% were made, and pure *trans* and *cis* monoene fractions were collected. This method can also be used to separate saturates from *cis* and *trans* monoenes. The *cis,trans-*, *cis,cis-*, and *trans,trans*-9,12-octadecadienoates were separated. While *cis,trans* and *trans,trans* dienes were eluted separately, the *cis,cis* diene isomer remained on the column.

1692 • Double Bond Migration in Methyl Eleostearate During Gas-Liquid Chromatographic Analysis

K. L. Mikolajczak and M. O. Bagby

J. Am. Oil Chemists' Soc. 41(5):391. May 1964

The double bonds in methyl β-eleostearate migrate considerably when subjected to gas-liquid chromatography (GLC) analysis. Material eluting from a GLC column was collected and cleaved by permanganate-periodate oxidation. GLC analysis of the methyl esters of the dibasic acid fragments gave the following composition (area percent): heptandioate, 6.2; octanedioate, 18.5; nonanedioate, 43.2; decanedioate, 25.3; and undecanedioate, 6.8. Methyl β-eleostearate not subjected to GLC analysis yields only nonanedioate.

1693 • Characterization of a Methyl Linoleate-Iron Carbonyl Complex

E. N. Frankel, E. P. Jones, and C. A. Glass

J. Am. Oil Chemists' Soc. 41(5):392. May 1964

Heating methyl linoleate and iron pentacarbonyl at 180°C. in either hydrogen or nitrogen forms a stable complex, which can be separated by countercurrent distribution or alumina chromatography. Characterization by elemental and spectral analyses, NMR, and degradation studies shows that we deal with a mixture of conjugated methyl octadecadienoate-iron tricarbonyl complexes. A structure is proposed that involves overlapping of iron orbitals and conjugated diene *pi*-orbitals.

1694 • A Cadaver Yeast and Related Species

Lynferd J. Wickerham

Mycologia 56(3):398-414. May-June 1964

A yeast, *Hansenula petersonii,* that grew abundantly inside embalmed cadavers proved to be a new species. It exists in two forms—one oxidative, the other fermentative. When growing in still liquid media, the oxidative form mutates by degrees to the oxidative form. This transformation involves (1) changes in the ratio of lipid to carbohydrate on the walls of the cells—the lipids cause the cells to float and develop as a pellicle; (2) changes in enzyme system from those causing fermentation to those causing assimilation and oxidation of metabolites; and (3) a change from inability to produce ascospores to ability to do so. *H. petersonii* is related to *H. jadinii* and to *Candida utilis,* the feed yeast most commonly used. All three species have a high tolerance for toxic substances.

1695 • Preparation of 9,15-Octadecadienoate Isomers

R. O. BUTTERFIELD, C. R. SCHOLFIELD, and H. J. DUTTON

J. Am. Oil Chemists' Soc. 41(6):397-400. June 1964

Linolenic acid was reduced with hydrazine to produce a mixture containing a maximum of dienoic acids. After methylation this mixture was separated into trienoic, dienoic, monoenoic, and saturated esters by countercurrent distribution (CCD) with acetonitrile and hexane. The dienoic ester was further fractionated by CCD with methanolic silver nitrate and hexane to separate pure *cis,cis*-9,15-octadecadienoate and the equimixture of *cis,cis*-9,12- and 12,15-octadecadienoates.

Following isomerization of the *cis,cis*-9,15-octadecadienoate with selenium, the geometric isomers were fractionated by CCD with methanolic silver nitrate and hexane. Pure *trans,trans* and pure *cis,cis* isomers were isolated, as well as an unresolved mixture of *cis,trans* and *trans,cis* isomers. The characteristics of these isomers and related compounds are compared as determined by CCD, infrared absorption, and capillary gas-liquid chromatography.

1696 • Soybean Unsaponifiables: Hydrocarbons from Deodorizer Condensates

C. D. EVANS, J. OSWALD, and J. C. COWAN

J. Am. Oil Chemists' Soc. 41(6):406-411. June 1964

Molecular distillation of deodorizer condensates followed by chromatography on alumina, gave substantial quantities of hydrocarbons free of other unsaponifiable constituents. Squalene comprised 50% of the hydrocarbon fraction and contained practically all the unsaturation. A crystalline, saturated hydrocarbon fraction of 4.2% was composed primarily of C_{29} and C_{31} paraffins. An unresolved fraction was composed of two major components, each estimated to contain about 30 or 35 carbon atoms. Minor amounts of many hydrocarbons with chain lengths of 15-35 carbon atoms were present but not completely identified. C^{14} analysis showed that the hydrocarbons are natural to soybean oil and that they are not artifacts arising from petroleum solvent residues.

1697 • Light-Activated Hydrogenase in *Rhodospirillum rubrum*

RICHARD S. HANSON

Biochim. Biophys. Acta 79(3):433-445. May 1964

Reduction of 37.5 mM potassium ferricyanide by hydrogen with washed suspensions of *Rhodospirillum rubrum* cells in phosphate buffer requires light when calcium is added. Washed cells have little hydrogenase activity in Tris buffer, but they are activated by divalent metal-complexing anions, cadmium, zinc, and detergents. Light activation of hydrogenase activity in calcium-treated cells is inhibited by carbonylcyanide *m*-chlorophenylhydrazone and carbonylcyanide *p*-trifluoromethoxyphenylhydrazone. The reduction of 2,6-dichlorophenolindophenol and methylene blue by hydrogen is not affected by these agents and occurs without the addition of anions. Evidence is presented which indicates that calcium causes structural changes in the cell membrane to render it impermeable to ferricyanide and that energy derived from photophosphorylation can alter membrane permeability to overcome calcium inhibition.

REPUBLICATION

1474 • Stammesgeschichte und Biochemie der Hefen der Gattung *Hansenula*

L. J. WICKERHAM and K. A. BURTON

Monatsschr. Brauerei 17(5):81-89. May 1964

Originally published as "Phylogeny and Biochemistry of the Genus *Hansenula*" in Bacteriol. Rev. 26(4):382-397. December 1962.

GPO 811-905-2

CONTRACT RESEARCH PUBLICATIONS

[Report of research work done by an outside agency under contract with the U.S. Department of Agriculture and supervised by the Northern Utilization Research and Development Division.]

115-C • Copolymerization of Methyl Esters of Unsaturated C_{18} Fatty Acids
F. R. MAYO and CONSTANCE W. GOULD
Stanford Research Institute, Menlo Park, California
J. Am. Oil Chemists' Soc. 41(1):25-29. January 1964

116-C • Some Recent Advances in the Chemistry of Malting
JAMES R. FLEMING and JOHN A. JOHNSON
Kansas State University, Manhattan
Cereal Sci. Today 9(3):67-68, 88. March 1964

117-C • Glucose Catabolism by *Bacillus popilliae* and *Bacillus lentimorbus*
ROLLIN E. PEPPER and RALPH N. COSTILOW
Michigan State University, East Lansing
J. Bacteriol. 87(2):303-310. February 1964

118-C • Nutritional Requirements of *Bacillus popilliae*
CHARLES J. SYLVESTER and RALPH N. COSTILOW
Michigan State University, East Lansing
J. Bacteriol. 87(1):114-119. January 1964

119-C • Amino Derivatives of Starches. Amination of Amylose
M. L. WOLFROM, MAHMOUD I. TAHA, and D. HORTON
Ohio State University, Columbus
J. Org. Chem. 28(12):3553-3554. December 1963

120-C • The Effect of Electrolytes on the Ultracentrifugal Stability of Emulsions
ROBERT D. VOLD and ROBERT C. GROOT
University of Southern California, Los Angeles
J. Colloid Sci. 19(4):384-398. April 1964

121-C • Wheat Gibberellins
JAMES R. FLEMING and JOHN A. JOHNSON
Kansas State University, Manhattan
Science 144(3621):1021-1022. May 1964

122-C • **Catalysts for Selective Hydrogenation of Soybean Oil. II. Commercial Catalysts**

C. H. Riesz and H. S. Weber
Illinois Institute of Technology Research Institute, Chicago
J. Am. Oil Chemists' Soc. 41(6):400-403. June 1964

[Report of research work supported with funds provided by the U.S. Department of Agriculture under the authority of U.S. Public Law 480, 83rd Congress, and sponsored by the Northern Utilization Research and Development Division.]

42-F • **The Determination of the Molecular Weight of Poly-L-Lysine**

Arieh Yaron and Arieh Berger
The Weizmann Institute of Science, Rehovoth, Israel
Biochim. Biophys. Acta 69(2):397-399. February 1963

43-F • **The Effect of Urea and Guanidine on the Helix Content of Poly-N^5-(3-hydroxypropyl)-L-glutamine in Aqueous-Solvent Systems**

Arieh Yaron, Noah Lupu, Michael Sela, and Arieh Berger
The Weizmann Institute of Science, Rehovoth, Israel
Biochim. Biophys. Acta 69(2):430-432. February 1963

44-F • **Polyesters Containing Carbohydrate Residues**

W. A. P. Black, E. T. Dewar, and J. B. Hare
Arthur D. Little Research Institute
Musselburgh, Midlothian, Scotland
J. Chem. Soc. 1963:5724-5727. December

45-F • **Species of *Mortierella* from India-III**

B. S. Mehrotra and Usha Baijal
University of Allahabad, Allahabad, India
Mycopathol. Mycol. Appl. 20(1-2):49-54. August 1963

46-F • **Use of a Digital Computer for Evaluating Ultracentrifuge Data**

S. P. Spragg
University of Birmingham, Birmingham, England
Nature 200(4912):1200-1201. December 21, 1963

47-F* • **Reactions of Fatty Acids and Their Derivatives in Alkalis**

M. F. Ansell and B. C. L. Weedon
London University, London, England
Ind. Chemist 40(2):70-73. February 1964

48-F • **Sedimentation and Electrophoresis of Interacting Substances. III. Sedimentation of a Reversibly Aggregating Substance with Concentration Dependent Sedimentation Coefficients**

G. A. GILBERT
University of Birmingham, Birmingham, England

Proc. Roy. Soc. (London), Ser. A, 276(1366):354-366. December 1963

49-F • **A Rapid Paper Chromatographic Method for Separation and Identification of Soybean Sapogenols**

B. GESTETNER
Hebrew University, Rehovoth, Israel

J. Chromatog. 13(1):259-261. January 1964

50-F • **Helical Features in the X-Ray Pattern of Poly-(λ-hydroxypropyl)-L-glutamine**

W. TRAUB
The Weizmann Institute of Science, Rehovoth, Israel

Acta Cryst. 16, Part 8:842. August 1963

51-F • ***Linderina pennispora* Raper & Fennell from India**

USHA BAIJAL
University of Allahabad, Allahabad, India

Mycopathol. Mycol. Appl. 21(2):109-111. December 1963

52-F • **Componenti Minori degli Olii Vegetali. Separazione e Studio degli Alcooli Triterpenici e degli Steroli.**

[Minor Constituents of Vegetable Oils. Separation and Examination of Triterpene Alcohols and Sterols]

P. CAPELLA, E. FEDELI, M. CIRIMELE, A. LANZANI, and G. JACINI
Experiment Station for the Fats and Oils Industries, Milan, Italy

Riv. Ital. Sostanze Grasse 40(12):660-665. December 1963

53-F* • **Copolymerisation of 3-O-Allyl-1,2:5,6-di-O-isopropylidene-α-D-glucofuranose with Acrylonitrile**

W. A. P. BLACK, E. T. DEWAR, and D. RUTHERFORD
Arthur D. Little Research Institute
Musselburgh, Midlothian, Scotland

Makromol. Chem. 71:189-192. February 1964

54-F • **Ricerche Sull'autossidazione di Sostanze Grasse Poliinsature. Nota IV: Preparazione di Alcuni Complessi bis-Salicilaldeide(β,β dialchil)-propilendiimmina e Purificazione dei Complessi per Cromatografia su Strato Sottile**

[Research on the Autoxidation of Polyunsaturated Fatty Materials. IV. Preparation of Some Complexes of bis-Salicilaldehyde(β,β dialkyl)-propylenediimine and Purification of These Complexes by Thin-Layer Chromatography]

E. Fedeli, P. Capella, A. F. Valentini, and G. Jacini

Experiment Station for the Fats and Oils Industries, Milan, Italy

Chim. Ind. (Milan) 45(12):1522-1524. December 1963

55-F • **Ricerche Sull'autossidazione di Sostanze Grasse Poli-insature. Nota II**

[Research on the Autoxidation of Polyunsaturated Fatty Materials. II]

E. Fedeli, P. Capella, G. Acampora, and G. Jacini

Experiment Station for the Fats and Oils Industries, Milan, Italy

Riv. Ital. Sostanze Grasse 40(12):619-626. December 1963

56-F • **Separazione Cromatografica in Strato Sottile dei 2,4-Dinitrofenilidrazoni delle Aldeidi e dei Chetoni**

[Separation by Thin-Layer Chromatography of 2,4-Dinitrophenylhydrazones of Aldehydes and Ketones]

E. Fedeli, P. Capella, and L. Tadini

Experiment Station for the Fats and Oils Industries, Milan, Italy

Riv. Ital. Sostanze Grasse 40(12):669-673. December 1963

57-F • **Infra-Red Spectra of Polar Molecules Adsorbed on Titanium Dioxide Pigments**

Ieuan T. Smith

Paint Research Station, Teddington, Middlesex, England

Nature 201(4914):67-68. January 4, 1964

58-F • **Soybean Saponins. III. Fractionation and Characterization**

B. Gestetner, I. Ishaaya, Y. Birk, and A. Bondi

Hebrew University, Rehovoth, Israel

Israel J. Chem. 1(4):460-467. December 1963

59-F • **The Adsorption of Iodine on Starch**

J. Eliassaf and M. Lewin

Institute for Fibres and Forest Products Research

Ministry of Commerce and Industry, Jerusalem, Israel

Israel J .Chem. 1(3a):261-262. December 1963

60-F • **Gli Idrocarburi Contenuiti nella Frazione Insaponificabile di Alcuni Olii Vegetali**
[Hydrocarbons Contained in the Unsaponifiable Fraction of Some Vegetable Oils]
P. CAPELLA, E. FEDELI, M. CIRIMELE, and G. JACINI
Experiment Station for the Fats and Oils Industries, Milan, Italy
Riv. Ital. Sostanze Grasse 40(11):603-606. November 1963

61-F • **Separazione di Terpeni e Steroli su Strato Sottile di Silicagel G Impregnato con $AgNO_3$**
[Sterols and Triterpene Alcohol Separation by Thin-Layer Chromatography]
P. CAPELLA, E. FEDELI, M. CIRIMELE, A. LANZANI, and G. JACINI
Experiment Station for the Fats and Oils Industries, Milan, Italy
Riv. Ital. Sostanze Grasse 40(12):645-648. December 1963

PATENTS

[These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased (25 cents each) from the Commissioner of Patents, U.S. Patent Office, Washington, D.C. 20231. Order by number, do not send stamps.]

Composition for Inhibiting Seed and Fungal Spore Germination

CHESTER R. BENJAMIN, WILLIAM F. HENDERSHOT, and CLIFFORD W. HESSELTINE

U.S. Patent 3,117,853. January 14, 1964

Compositions for inhibiting the germination of seeds and of fungal spores comprise at least about 10 p.p.m. of the lactone of 2-oxo-6-(2-hydroxypropyl)-cyclohexane-carboxylic acid and about 1 percent of a surface active agent.

Method of Recovering Microbial Polysaccharides from Their Fermentation Broths

SEYMOUR PETER ROGOVIN and WILLIAM J. ALBRECHT

U.S. Patent 3,119,812. January 28, 1964

Microbial polysaccharides, such as that produced as very dilute solutions in whole culture fermentations of *Xanthomonas campestris* NRRL B-1459, are quantitatively obtained as readily filterable precipitates by diluting the polysaccharide-containing fermentation broth with at least 2 parts of water, adding 0.35 to 1.0 percent of an alkali metal chloride when the aqueous diluent is less than 5 times the volume of the fermentation broth, adding 0.8 parts of a quaternary amine as cetyltrimethylammonium chloride based on the dry weight of the polysaccharide, stirring for about 10 minutes to form a precipitating complex therewith, isolating the complex, successively washing the complex in methanol containing 0.1 percent alkali metal chloride to dissociate the complex without gelatinizing or dissolving the freed polysaccharide, recovering the polysaccharide from the final methanol wash, and drying under vacuum. The quaternary amine is concentrated by evaporation of the pooled methanol washes and recycled in a continuous process.

Linolenate-Derived Cyclic Monomer Fraction

CHARLES R. SCHOLFIELD, JOHN C. COWAN, and JOHN P. FRIEDRICH

U.S. Patent 3,119,850. January 28, 1964

Linolenic acid or ester thereof is isomerized at 235° to 295°C. with an excess of 25 to 100 percent of the sodium salt of ethylene glycol or the potassium salt of tertiary butyl alcohol (over that required to produce the salt) for 15 minutes to 8 hours to form a mixture comprising cyclic acids from which several potentially useful derivatives have been made.

Method for Conducting an Electrochemical Oxidation

EARL B. LANCASTER, HOWARD F. CONWAY, and FRANK C. WOHLRABE

U.S. Patent 3,131,137. April 28, 1964

A concentric, annular-type electrolysis cell adapted for the more efficient oxidation of iodate to periodate and the periodate oxidation of starch to dialdehyde starch, said cell comprising an external tubular anode defining the outer wall of the anolyte compartment, centrally thereto at a uniform distance not exceeding 0.5 to 1.0 inch an annular porous ceramic diaphragm defining the inner wall of the anolyte compartment and the outer wall of the catholyte compartment, and centrally within said catholyte compartment at a uniform distance from the inner wall of said porous ceramic diaphragm an iron rod cathode having a surface area about 0.1 that of the anode, one embodiment of said anode additionally being tapered to an orifice at the bottom and having a corresponding side arm for the rapid forced circulation of starch to prevent iodide and alkali degradation and uneven oxidation thereof.

Glyoxal 1-(2′)-(2,4-Dihydroxy-2-butenal)-1-(3′)-(D-erythrose) Acetal

LEWIS A. GUGLIEMELLI, GARY L. MAYER, and CHARLES R. RUSSELL

U.S. Patent 3,132,181. May 5, 1964

A novel polyaldehydic compound, namely glyoxal 1-(2′)-2,4-dihydroxy-2-butenal)-1-(3′)-(D-erythrose) acetal, said compound being further characterized by having an enol-acetal linkage, one carbon-to-carbon double bond, three identifiable aldehyde groups, and three hydroxyl groups is obtained by first swelling about 60 mole equivalents of substantially fully oxidized dialdehyde starch essentially anhydrous, obtained by substantially complete periodate oxidation of starch in anhydrous methyl alcohol, cooling the methanol slurry to not above about 20°C., adding 1 mole equivalent of a methanolic solution of an alkali methoxide, reacting for 12 to 18 hours at room temperature, adding the partially depolymerized solution to acetone to precipitate a first crop of crude amorphous product, concentrating the separated liquor at 40°C. under reduced pressure, and adding fresh acetone to precipitate a crop of pure crystalline product. The new compound is an effective crosslinking agent for protein, and imparts a high degree of wet-rub resistance to casein pigment paper coatings.

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Similar lists of publication abstracts and patents are available from the other three Regional Utilization Research and Development Divisions of the Agricultural Research Service, U. S. Department of Agriculture. The addresses and fields of research covered are:

Division	Principal Fields of Research
Eastern Utilization Research and Development Division 600 East Mermaid Lane Philadelphia, Pennsylvania 19118	Animal products: dairy, meat, fats, and leather; plant products: Eastern fruits and vegetables, tobacco, honey, maple, and new crops; and allergen studies.
Southern Utilization Research and Development Division Post Office Box 19687 New Orleans, Louisiana 70119	Cotton and cottonseed; tung fruit; pine gum; Southern fruits and vegetables, including citric, sweetpotatoes, and cucumbers; sugarcane; rice; peanuts; and new crops.
Western Utilization Research and Development Division 800 Buchanan Street Albany, California 94710	Western fruits, nuts, vegetables, and rice; poultry products; forage crops; wheat and barley; wool and mohair; sugar beets; dry beans and peas; castor beans; and new crops.

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